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(54) **Cushioning and impact absorptive means for footwear.**

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Description

This invention relates to cushioning and impact absorption means for footwear. There has been given a significant amount of thought to modifications to shoe structures, particularly the sole component, of footwear, and more specifically athletic shoes, in an effort to combat the damage sustained by the foot generally during activity undertaken through athletic shoe usage. For example, one such modification to the sole of a sports shoe is described in US-A-4,430,810 wherein elastically flexible material is inserted within the heel wedge portion of an athletic shoe in order to dampen the vibrations and shock occurring which running, especially upon a hard track. But, in this particular instance, the method for alleviating those problems apparently includes the insertion of various bar shaped support members into apertures provided within the urethane formed sole for the therein disclosed athletic shoes. Other means for alleviating these particular problems is to simply provide a series of apertures within the shoe sole, such as shown in the exercising device formed as an attachment to the sole of a shoe as disclosed in US-A-3,785,646. Another concept for alleviating the forces encountered by the athlete during usage of the sports shoe is the provision of a series of arch like apertures arranged within at least the heel portion of such a shoe, as disclosed in US-A-4,236,326.

Thus as the foregoing indicates, there are a voluminous number of shoe and sole structures designed principally for the provision of cushioning for the shoe, to protect the foot, as during the footwear application.

It is the principle object of this invention to add a cellular insert into the construction of a generally foam formed sole for footwear, and more specifically an athletic shoe, for the purpose of resisting and dampening the transmission of the forces of impact from the ground, through the shoe sole, and to the foot of its wearer.

Another significant object of this invention is to furnish the athlete with means for attaining energy efficiency and conservation by embedding within the shoe sole the insert of this invention for providing sustained rebound capacity resulting in greater energy return with each foot stride, therefore reducing foot fatigue, as well as actually reducing the energy necessary to run at a given pace.

A further object of this invention is to provide a cellular coil system that is embedded at particular locations within the shoe sole, and which is predetermined and designed for resisting specific directional forces of impact encountered by the shoe during usage by the athlete or other person.

Another object of this invention is to design into the construction of the sole of an athletic or other shoe preferably a woven polymer cellular insert that adds multi-dimensioned densities to the shoe sole constructi n and which effectively resist f rces of impact.

In order to attain these objects the invention provides a cushioning and impact absorption means for footwear as described in claim 1. Preferred embodiments are contained in the claims 2—18.

Although it has become known by US-A-3,005,272 to provide an inflatable type of void contained within footwear sole, apparently to add cushioning to it, it is entirely distinct from what is provided by the invention, namely the insertion of a woven coil means which are connected together with their edges, and then have upper and lower layers sandwiching the coils therebetween, so that when pressure is applied upon it, it resists compression, and likewise, has inherent flex so as to snap the shoe sole back to its regular configuration, while the runner is running. Thus, it saves the runner energy, adds recoil to his shoe, and resists the impact of compressive forces. This really cannot be achieved through the usage of pneumatic sole, other than perhaps it might add cushioning to the sole itself, no recoil is achieved by the prior art as it does with the present invention.

Moreover US-A 4,561,195 shows a midsole assembly with a corrugated sheet that provides stiffness, and therefore perhaps may have some inherent resiliency, such as not described in its specification. It appears that the known rubber insert is designed strictly for shock absorbing, whereby resisting compressiveness, and not to add resiliency to the sole below to snap back into its regular condition, during usage of athletic shoe. On the contrary, the present invention has a series of coils contained within the sole, or an insert within the sole, and with upper and lower layers of woven ends locating the coils with respect to each other, so as to add to their resiliency and resistance to compression.

Furthermore, US-A 3,449,199 shows a means for constructing reinforced materials, and their making same. But it cannot be seen where the helicals are interlinked together along their sides, nor is there an upper and lower layer of woven fabric material that provides for resiliency, after the material is bent, and then allowed to snap back into its regular condition. On the contrary, it is the linking of the coils together along their edges, with the addition of the upper and lower layers, that further adds to the compressiveness of the material of the invention and particularly after it is bedded within an athletic shoe sole.

This invention contemplates the locating integrally within particular portions of the sole structure for footwear, and more specifically an athletic shoe, flexure style of woven or wound material, such as of polymer, nylon, or the like, and which is designed having a higher Durometer or Shore hardness than that of the surrounding foam, such as urethane foam, from which the basic sole structure is fabricated, in order to effectively resist the forces of impact encountered by the fo t of the athlete during participation within rather vigorous sporting events. Such woven material may b of the resilient type, being

flexible in texture, but having sufficient hardness to return to its initial structural shape after deformation. Also, it can resist pressure exerted upon it. By way of example, it is well known that the athlete, such as a basketball player, when descending from a jump, may sustain impacting forces many times greater, such as three to four times his own weight, so that when an athlete such as of the two hundred pound class, hits the floor upon a descent, the forces of impact upon the shoe sole may be in the range four to six hundred pounds. These are significant forces, and when repeatedly encountered by the athlete while strenuously partaking within such an event for any duration, can lead towards fatigue, and eventually injury, over a period of time. Hence, the essence of this invention is the incorporation of means to absorb or resist the transmission of these forces to innersole of the foot of the athlete, through the application and usage of the herein designed footwear, incorporating the cellular insert of this particular invention.

This invention generally envisions the formation of a woven like fabric of material, having a series of cellular components, exhibiting sine wave characteristics, formed intermediate a pair of fabric layers, the cavities formed within the interior of the components being either void, or filled with the same or different foam like material from which the shoe sole is constructed. In any event, the Durometer hardness of this cellular insert is greater, as much as two to eight or more times, the hardness of the foam in which it is implanted, and thus, due to the circular or spiral pattern formed of the cellular component, and which also may be helical wound in its construction, the forces of impact are absorbed by these plurality of structures, in order to resist the transmission of these forces from the ground and to the athlete's foot. As is well known, soles formed alone from the polyurethane liquid foam system exhibit just poor shock absorbing characteristics.

The cellular insert, forming the components, may be arranged at particular locations within the athletic shoe, depending upon the style of sporting event for which the shoe is predesigned. For example, in the standard athletic shoe, the coil or component system of the cellular insert may be arranged substantially centrally and along the length of the formed sole. On the other hand, where a jogging shoe is involved, dual or more layers of the cellular insert may be located integrally within the head-sole structure for the shoe, in order to be more effective in resisting direct forces encountered by the runner as the heel repeatedly impacts directly upon the ground during the repeat running motion. Alternatively, in a basketball style of shoe, the system designed as most effective is the arrangement of the cellular coil unit along the upper surface of the shoe sole, just under and in proximity of the shoe inner sole, in order to provid for resistance against the transmission of the forces along the entire length of the shoe sole, since, during participation in basketball, the forces of impact are encountered from a variety of directions upon the underside of the shoe.

In addition, the cellular insert may be located transv rsely of the shoe, longitudinally of the same, or in a variety of other angular directions, all as believed to provide the most effective resistance against force transmission through the sole for the athletic shoe. Furthermore, the cellular insert may be located within a separately formed midsole portion for the sole, and then encapsulated within the overall sole structure, as it is fabricated into the finished athletic shoe. In addition, the woven structure for the cellular insert may include, or be separately formed, as spirally wound stand of polymer, or related materials, having Durometer or Shore hardness generally exceeding that of the foam material in which it inserts, in order to resist against force transmission. Furthermore, these wound cellular components may be particularly shaped, such as having flattened upper and lower surfaces, and be perpendicularly arranged, in order to resist directly against the line and direction of force transmission, such as along the upper and lower surfaces of the shoe sole. Or, at the heel portion of the jogging or running style of shoe; the shaped woven fabric may have flattened or related surfaces designed for exposure substantially perpendicularly to the direction of transmission of the impact forces, in order to better absorb such pressures, and to resist against their transmission to the foot. The invention will be described below in greater detail with reference to the drawings in which:

FIG. 1 is a perspective view of an athletic shoe;

FIG. 2 is a side view of the shoe sole;

FIG. 3 is a top view of the shoe sole;

FIG. 4 is a longitudinal sectional view taken along the line 4—4 of FIG. 3, disclosing the cellular insert embedded within the shoe sole;

FIG. 5 is a transverse sectional view taken along the line 5—5 of FIG. 2, disclosing one of the cellular components of the insert for the shoe;

FIG. 6 discloses the locating of a cellular component within the sole of the shoe, and shows the location of various foamed shock absorbing plugs arranged therein;

FIG. 7 is a view similar to that of FIG. 6;

FIG. 8 shows a woven cellular insert of this invention, before its embedding within the sole of an athletic shoe;

FIG. 9 is a longitudinal sectional view similar to that shown in FIG. 4, disclosing larger style cellular components formed of the insert for the sole of a running shoe;

FIG. 10 is a longitudinal sectional view similar to that as shown in FIG. 4 disclosing a plurality of layers for the cellular components of the insert for the sole of a running shoe;

FIG. 11 discloses a formed sole for a court shoe showing the locating of the cellular insert for this invention within its s l porti n;

FIG. 12 discloses a longitudinal sectional view of the sole for a court or basketball shoe disclosing the cellular insert provided therein;

FIG. 13 is a longitudinal sectional view showing the cellular insert encapsulated within a midsole that is constructed into the formed sole for a running or other shoe;

FIG. 14 provides a top view of a running shoe sole, similar to that disclosed in FIG. 3, showing the arrangement of various cellular components disposed both transversely and longitudinally within the sole structure for a running shoe;

FIG. 15 provides a side view of the running shoe shown in FIG. 14, disclosing the cellular insert located proximate the upper surface of the shoe sole;

FIG. 16 discloses a modification to the woven cellular insert of this invention, in this particular instance, comprising a spirally, helically, or otherwise wound material for locating as an insert within the sole of an athletic shoe;

FIG. 17 is an end view of the wound material disclosed in FIG. 16;

FIG. 18 discloses a modification to the woven cellular insert of this invention, in this particular instance comprising a spirally, helically, or otherwise wound material and shaped for locating as an insert within the sole of an athletic shoe;

FIG. 19 is an end view of the wound material disclosed in FIG. 18;

FIG. 20 discloses the heel end of a sole for an athletic shoe, disclosing a cellular insert of the wound type embedded therein and which has particular shaped or flattened surfaces for convenient disposition within the athletic shoe sole, and for resisting against the transmission of the forces of impact encountered by it during its application; and

FIG. 21 provides a sectional view of the embodiment disclosed in FIG. 20, taken along the line 21—21 of said Figure.

In referring to FIGS. 1 through 3, the basic configuration of an athletic shoe comprises a shoe upper 1 integrally secured with its sole portion 2. In this particular instance, the sole is designed for footwear usage as a running shoe, wherein generally the shoe incorporates a rather thickened heel portion, as at 3, having an inclining segment 4, which is generally that portion of the shoe that initially repeatedly contacts the ground during running. The frontal portion of the shoe usually tapers into a thin line dimension, as at 5, and then wraps upwardly about the toe cap for the shoe upper.

As can be seen in FIG. 4, the insole insert, as at 6, is integrally fabricated within the construction of the said sole portion, as it is formed during shoe fabrication. Essentially, as previously described, the shoe soles normally are fabricated as a polyurethane or other foamed or solid polymer, formed in the mold, and then applied to the shoe upper. Or, under more current technology, in certain instances the sole portion for the athletic shoe may be foamed or formed in place, in its securement to the shoe upper, during footwear fabrication.

The cellular insert 6 comprises the various cellular components, as at 7, including a series of annular lik portions, which ar linked together by means of upper and lower linking or lining means 8 and 9, respectively, which have a tendency to weave the cellular compon nts together into a fabricated structure.

In the preferred embodiment, the cellular insert of this invention generally is formed of a woven material, generally of a polymer, such as nylon, of polypropylene, polyethylene, or of other monofilament or copolymer structures, and as can be seen in FIG. 8, comprising an upper layer of material 8, as previously referred to, having a lower woven liner 9 with the series of cellular components 7 arranged intermediate thereof. The intermediate layer is preferably formed of a pair of inverted, with respect to each other, sine wave configured inter meshing layers of woven material that forms together the cellular like components for the insert of this invention. In this configuration, any pressure exerted upon the liners is exerted to the components 7, which when spread apart, or tending to flatten, force against each other to function as a buffer and pressure absorber. This is not to unlike corrugations of fabricated board. And, this particular material may be located in place within the mold for forming of the foamed shoe sole so that when the sole is fabricated, from generally a polyurethane or other foam, or other polymer material, the cellular insert will be located in place embedded integrally within the formed sole. As can be seen, as in FIG. 4, the cellular insert may comprise a series of the cellular components 7, which may be of consistent diameter, such as of one-half inch, more or less, and then reducing in size, so as to be conveniently accommodated within even the front portion of the sole, as at 5, as can be seen.

As also previously described, the polymer material forming the cellular insert of this invention may be formed of a variety of materials, generally of polymer construction, such as polypropylene or polyethylene, or the like, and will have a Durometer or Shore C hardness in the range in excess of that preferred hardness for the fabricated sole material. In addition, as also previously explained, the liquid formed foam material normally fabricating the sole portion 3 for an athletic shoe is in the range of a Sh re hardness of between about 20 to 60, and density of about 0.08 to 0.5, for a basketball type shoe, although in the preferred and usual commercially fabricated athletic shoe, the sole will be of a Shore hardness approximating 50. As a further example, a tennis shoe will normally have a Shore C hardness of between 65 to 72, comprising a density of about 0.50 to 0.63. Hence, as explained, the hardness of the material forming the cellular insert of this invention is of a hardness generally exceeding that of the foamed sole, and therefore, due to its particular configuration, functions as a resistor and dampener against the transmission of any forces of impact through the sole and to the foot of the athlete wearing the designed shoes.

As can be seen in FIG. 5, which is a cross

section of the heel portion of the sole taken from FIG. 2, the cellular insert fits compactly within the sole structur , and disposes its upper layer of woven material 8 equispaced from the upper surface of the sole embodiment and arranged intermediately with the lower layer of material 9 with the various cellular components 7. Thus, as can be understood, the cellular components function in the nature of a compound arch within the sole structure, and have a tendency to resist forces exerted substantially diametrically of their location within the sole structure. Hence, provision of a substantially flattened upper and lower layers 8 and 9 for the woven material functions as means for initially absorbing any forces of impact exerted upon the sole structure, with the cellular inserts 7 tending to furnish resistance or absorption of any of these forces through the principle of compression so as to effectively minimize their transmission through the sole structure and to the foot of the athlete.

For a running shoe, the usual foamed sole has a Shore C hardness of about 47 to 53, with a density of about 0.18 to 0.19. On the other hand, the heel structure of such a shoe may be formed of a more hardened foam or other polymer material to more effectively resist against the forces of impact. For example, forming the heel segment from a foam having a Shore C hardness of about 60 to 65, and a density range of between about 0.20 to 0.21, has been an improvement.

FIG. 6 discloses the sole structure showing schematically, as at 10, one of the cellular components therein, and incorporating internally of any cellular component various inserts, of encapsulated foam material, as at 11, which may be of a different, either lighter or heavier, density from that foam 12 forming the basic sole structure 3 for the athletic shoe. Thus, having a foamed insert arranged internally of the cellular component 10, such insert as shown at 11, and being of a different density from that formed of the sole structure per se, perhaps of a thicker density, functions to provide for compound resistance against forces of impact in order to shelter the foot of the athlete at various locations and where the most pointed and direct forces may be encountered by various portions of the foot during shoe usage.

FIG. 7 discloses how a further shock absorption plug 13, also of different density from the foam 12, forming the sole 3 of the shoe may be located within the cellular component 14, so as to add further resistance against pointed forces of transmission.

In referring to FIG. 9, one other variation upon the location of the cellular insert of this invention, such as shown at 15, and located within a sole structure 16 for a jogging or running shoe is readily disclosed. In this particular instance, the cellular components 17 are arranged along the length of the sole structure, are of substantial height, interconnected together at their points of adjac ncy, as by strands of linking means, as at 18, and extend much higher and lower within the sole structure 16, in order to add to the means for resistance in transmission of forces of impact through the sole structure and to the foot of the athlete. In this particular instance, as noted, the foamed structure of the sole 16 does not the fill the cavities contained within the cellular components 17, and therefore, force transmission may be effectively rejected through the arrangement of the cellular insert 15 of this particular invention. In this embodiment, the liners normally arranged above and below the component, may or may not be included.

A further embodiment for a running shoe is shown in FIG. 10. In this particular instance, the sole structure 19 includes a series of cellular inserts, as at 20 and 21, as noted, and in the shown structure, the cellular inserts are provided at dual layers, particularly at the heel portion 22 of the shoe, and since this embodiment is of the jogging shoe variety, the greater forces of impact encountered by the shoe during its application is at the situs of the heel, which first impacts with the ground repeatedly during participation in a running exercise.

The cellular inserts and coil system for the invention as disclosed in FIGS. 9 and 10 are of the type that are directly encapsulated within the sole structure during its injection molding, and present a dual density polyurethan midsole structure that effectively resists excessive pressures. The direct injection process is a standard procedure utilized in the shoe making process, wherein the polyurethane foamed bottom sole structure is directly attached through molding to the shoe upper. In this particular instance, during shoe fabrication, in this manner, the cellular insert and coil system of this invention is arranged underneath the shoe upper, with the latter then being covered and encapsulated within the polyurethane form midsole, as it is foamed in place to complete a fabricated shoe, in this particular instance, of the athletic style. And, as previously explained, the coil system of this invention may be located at isolated locations, and while FIG. 10 may disclose a dual layered cellular insert embodied within the shoe structure, it is just as likely that only a single layer, or dual or more layer, of the coil system may be located only within a part of the sole portion of the shoe, in order to provide the greatest resistance against pressure at that location where forces at a maximum are encountered by the shoe, particularly while partaking in running, jogging, or during racing.

FIG. 11 discloses the fabrication of the cellular system of this invention, comprising the cellular insert 23 that may be embedded integrally within the sole portion of, in this particular instance, another form of athletic shoe, or perhaps a c urt or basketball shoe. In this particular instance, the insert is located only within the heel portion for the sole 24 formed for the athletic shoe, and in this manner the sole may be formed of a polyurethane foam, or perhaps a dense form of polyurethane, or oth r polymer, such as may

normally be used in the fabrication of the basketball shoe.

In addition to the foregoing, and referring to FIG. 12, the sole structure 25 for a court shoe may include the cellular insert or coil system 26 of this invention over its entire length, comprising a series of the interconnected cellular components 27 arranged along the longitudinal length of the sole at its frontal portion, and then interconnecting with a pair or more of the cellular components 28 embedded at the heel portion of the shoe sole. And, linking means 29 formed of the same or related polymer material from which the cellular components 27 and 28 are formed, may interconnect between the components arranged at the heel to the foreward sole portion for the disclosed shoe. Lining may or may not be provided. And, as can further be seen, the cellular inserts are arranged closer to the upper surface of the shoe sole, so that when the sole 25 is adhered into position along the bottom surface of the shoe upper, it presents its cushioning means, and force absorption means, more directly adjacent to the underside of the shoe insole, and just contiguously underneath of the foot of the athlete located therein.

Another variation upon the structure of this invention is shown in FIG. 13, wherein in this particular instance, this style of sole 30 may be adhered and connected to the upper of a running shoe. Once again, the cellular insert 31 comprising a series of interconnected cellular components 32 are initially embedded within a midsole bed of polyurethane or other foam material, as at 33, in order to provide for a prefabrication of the cushioning means of this invention. As an example, the density of this foam may be in the range of 0.3 to 0.35, having a Shore C hardness of about 25 to 30. The remaining portion of the sole 30 may be as previously explained. Then, this particular midsole type of preconstructed cellular insert, with its encompassing foam, may be dropped into the hollowed pylon blocker unit that makes up the midsole wedge unit of the athletic shoe which is then put together with the shoe upper and outsole or other sole portion 34 when forming the finished product. In this manner, the blocker or insert 33 will be open on its top side so that the coil system 31 will be arranged in as close a proximity to the undersurface of the foot, and it is believed that such contiguity affords a greater resistance against transmission of forces of impact through the shoe sole, in order to better protect the foot of the athlete. The advantage of this particular method is that it offers increased cushioning and stability with sufficient foam stiffness that may be of enhancement to the safety of the athlete when utilizing this particular structure as a court shoe, or as a basketball shoe.

FIG. 14 discloses a slight modification to the structure of this invention, and its incorporation within the sole of an athletic shoe. And, FIG. 15 shows, from a side view the arrangement of the cellular inserts 35 within the foamed structure of the shoe sole. In this particular instance, as can be seen in FIG. 15, the insert is located adjacent the upper edge of the formed shoe sole, and includes a series of transversely arranged cellular components, as at 36, having a peripherally arranged cellular component 37 that is located around th side and marginal edges of the formed sole, arcuately encircling the back portion of the same, and then extending forwardly for extension transversely across the portion of the sole that is arranged under what is identified as the ball of the foot, with this particular component generally being shown at 38. Although the cellular insert of this particular style may be disclosed as embodied within the foamed structure of the sole for a running shoe, it is just as likely that this configuration could easily be embodied within the sole of a court shoe, or basketball shoe, since it is effective in resisting the forces of impact that are exerted upon the under surface of the sho from a variety of locations, and not simply at the back end of the heel, as encountered during usage of the shoe during jogging.

As can be seen in FIGS. 16 and 17, the cellular insert may be fabricated from a helical or spirally wound series of polymer, as can be noted, and which may, or may not, be linked together along their lateral edges into adjacent rows, as disclosed. Then, this composite may be located within the sole structure, when it is foamed in place, as previously described, to perform in the manner as envisioned for this invention. In addition, as can be seen in FIGS. 18 and 19, the wound strands of polymer may be shaped, in order to conform with that position within the sole structure where it locates. Also, the cellular components may be shaped having flattened or the like surfaces, as noted, and in this particular instance, being at its upper and lower surfaces, so as to dispose the surfaces to the upper and lower surfaces of the sole structure for the athletic shoe. Hence, pressure applied to the sole, as on its bottom surface, through performance in an event, will transmit that force to the lower surface of the structural component, and is believed to be absorbed by its vertical portions. In referring to FIGS. 20 and 21, it can be seen just how a particularly shaped wound strand of the polymer material forming the cellular component for this invention may be especially shaped to conform with the various sections of the athletic shoe in which it is disposed. For example, this particular structure shows the back portion for the running shoe, where it has its inclined edge, where noted, and which receives the brunt of the force of the runner during jogging. As noted, the wound material is shaped in order to conform with that particular design for the sole for the running shoe, in order to not only more conveniently fit for its embeddment within the sole structure, but effectively absorb any forces exerted at that location.

Claims

1. Cushioning and impact absorption means for applicati n within footwear of the type having a

shoe upper (1) affixed to a sole (2) formed at least partially of a polymer like material, comprising a shoe upper (1) and a shoe sole (2), said shoe upper (1) secured to a c llular insert (6) applied within the polymer like material forming said sole (2), said cellular insert (6) comprising layers (8, 9) of woven polymer material, and also comprising a series of cellular components (7) formed of woven polymer material and arranged intermediate and connecting to said layers (8, 9) of material, and having a series of cellular like woven coils, said cellular components (7) having upper, lower and side surfaces, said layers (8, 9) of polymer material connecting to the upper and lower surfaces of said cellular components (7), said cellular components having cavities generally formed therethrough, with said formed cavities being arranged intermediate the said upper and lower surfaces of the cellular components (7), said series of cellular components (7) provided therein being secured together by strands of linking means along their contiguous side surfaces, said cellular insert being arranged substantially aligned within the sole structure during shoe usage, said cellular insert as being formed of a woven polymer material having a hardness greater than the polymer material forming said sole, whereby the cellular insert formed within the sole tending to effect absorption of any forces of impact encountered by the footwear during usage.

2. Absorption means according to claim 1, wherein said cellular components (7) being formed of woven coils arranged intermediate the pair of woven layers (8, 9) of material, and said woven coils being arranged substantially transversely or longitudinally of the formed sole.

3. Absorption means according to claims 1 or 2, wherein said footwear comprising an athletic shoe.

4. Absorption means according to one of the claims 1 to 3, wherein said footwear sole is formed of foamed polymer.

5. Absorption means according to one of the claims 1 to 4, wherein said footwear having a heel portion, and said cellular insert (7) being provided embedded within the said heel portion of the formed sole.

6. Absorption means according to one of the claims 1 to 4, wherein said cellular insert (7) being provided substantially throughout the entire footwear sole.

7. Absorption means according to one of the claims 1 to 6, wherein said cellular insert comprising at least a single layer of cellular components.

8. Absorption means according to one of the claims 1 to 7, wherein said cellular insert being provided approximately centrally of the formed sole.

9. Absorption means according to one of the claims 1 to 8, wherein said cellular insert (7) being provided approximately in th upper portion f the formed sole.

10. Absorption means according to one of the claims 1 to 9, wherein the cellular cavities of the components being substantially void of the foam material forming the footwear sole.

11. Absorption means according to one of the claims 1 to 9, wherein the voids of the cellular components (7) being substantially filled with the foam material forming at least a part of the said footwear sole.

12. Absorption means according to one of the claims 1 to 11, wherein said cellular insert (7) comprising polymer formed helical wound cellular components having a cavity generally provided therethrough, whereby the cellular formed insert being encapsulated within the sole of the footwear.

13. Absorption means according to claim 12, wherein said helical wound cellular component being shaped to substantially conform the upper and lower surfaces of the footwear sole.

14. Absorption means according to claim 12, wherein said helical wound cellular component being substantially shaped and disposing at least a part of its surface.

15. Absorption means according to one of the claims 1 to 14, wherein said footwear sole being formed of an outsole portion, a midsole portion fabricated into said outsole portion, and said midsole portion having the cellular insert formed therein during footwear construction.

16. Absorption means according to claim 15, wherein the polymer material forming the outsole portion being of a more hardened polymer material than the polymer material forming the midsole portion.

17. Absorption means according to one of the claims 1 to 16, wherein said sole having heel and frontal sole portions, the polymer material forming the heel portion being of a more hardened polymer material than the polymer material forming the frontal sole portion.

18. Absorption means according to one of the claims 1 to 17, wherein said cellular insert formed of a pair of intermeshing sinusoidally shaped corrugated like woven material, said pair of woven material being inverted with respect to each other.

Patentansprüche

1. Einrichtung zur Polsterung und Stoßdämpfung für Schuhe, die versehen sind mit einem Schuhschaft (1), der an einer Sohle (2) befestigt ist, wobei die Sohle wenigstens teilweise aus einem polymerähnlichen Material besteht, dadurch gekennzeichnet, daß der Schuhschaft (1) an einer zellförmigen Einlage (6) befestigt ist, die innerhalb des die Sohle (2) bildenden polymerähnlichen Materials angeordnet und versehen ist mit Schichten (8, 9) aus gewobenem Polymermaterial, einer Reihe zellförmiger Komponenten (7), die aus gewobenem Polymermaterial gebildet und zwischen den Materialschichten (8, 9), diese verbindend, angeordn t sind, und einer R ih zellähnlicher gewobener Wicklungen, wobei die zellförmigen Komponenten (7) obere, untere sowie seitliche Flächen besitzen und die Polymer-

materialschichten (8, 9) mit den oberen und unteren Flächen der zellförmigen Komponenten (7) verbunden sind, daß die zellförmigen Komponenten Hohlräume aufweisen, die zwischen den oberen und unteren Flächen der zellförmigen Komponenten (7) angeordnet sind, daß die Reihen der zellförmigen Komponenten (7) durch Stränge einer Verbindungseinrichtung entlang ihrer aneinandergrenzenden Seitenflächen verbunden sind, daß die zellförmige Einlage (6) während des Gebrauchs des Schuhs im wesentlichen zum Sohlenkörper ausgerichtet in diesem angeordnet ist und, da sie aus einem gewobenen Polymermaterial besteht, eine größere Härte als das die Sohle bildende Polymermaterial besitzt, wobei die innerhalb der Sohle gebildete zellförmige Einlage (6) die Dämpfung von auf den Schuh während dessen Gebrauchs ausgeübten Stoßkräften bewirkt.

2. Dämpfungseinrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die zellförmigen Komponenten (7) aus gewobenen Wicklungen bestehen, die zwischen den beiden Schichten (8, 9) aus gewobenem Material und weitgehend quer oder längs zur geformten Sohle angeordnet sind.

3. Dämpfungseinrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Schuh einen Sportschuh bildet.

4. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Schuhsohle aus geschäumtem Polymer besteht.

5. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der Schuh ein Absatzteil aufweist und daß die zellförmige Einlage (7) in das Absatzteil der geformten Sohle eingebettet ist.

6. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die zellförmige Einlage (7) im wesentlichen durchgehend in der gesamten Schuhsohle vorgesehen ist.

7. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die zellförmige Einlage (7) wenigstens eine einzige Schicht zellförmiger Komponenten aufweist.

8. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß die zellförmige Einlage (7) etwa mittig in der geformten Sohle angeordnet ist.

9. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß die zellförmige Einlage (7) etwa im oberen Teil der geformten Sohle angeordnet ist.

10. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß die zellförmigen Hohlräume der Komponenten im wesentlichen frei von dem die Schuhsohle bildenden Schaummaterial sind.

11. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß die Hohlräume der zellförmigen Komponenten (7) weitgehend mit dem Schaummaterial gefüllt sind, das wenigstens einen Teil der Schuhsohle bildet.

12. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 11, dadurch gekennzeichnet, daß die zellförmige Einlage (7) aus Polymermaterial gebildete, schraubenförmig gewundene zellförmige Komponenten aufweist, die mit einem im allgemeinen durchgehenden Hohlraum versehen sind, wobei die zellförmig gebildete Einlage in der Schuhsohle eingekapselt ist.

13. Dämpfungseinrichtung nach Anspruch 12, dadurch gekennzeichnet, daß die schraubenförmig gewundene zellförmige Komponente derart geformt ist, daß sie den oberen und unteren Flächen der Schuhsohle weitgehend angepaßt ist.

14. Dämpfungseinrichtung nach Anspruch 12, dadurch gekennzeichnet, daß die schraubenförmig gewundene zellförmige Komponente im wesentlichen derart geformt ist, daß wenigstens ein Teil ihrer Oberfläche passend ausgerichtet ist.

15. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 14, dadurch gekennzeichnet, daß die Schuhsohle aus einem Laufsohlenteil besteht, in das ein Mittelsohlenteil eingebaut ist, wobei das Mittelsohlenteil die zellförmige Einlage aufweist, die während der Schuhherstellung hierin eingebracht ist.

16. Dämpfungseinrichtung nach Anspruch 15, dadurch gekennzeichnet, daß das das Laufsohlenteil bildende Polymermaterial härter ist als das das Mittelsohlenteil bildende Polymermaterial.

17. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 16, dadurch gekennzeichnet, daß die Sohle Fersen- und Vordersohlenteile aufweist und daß das das Fersensohlenteil bildende Polymermaterial härter ist als das das Vordersohlenteil bildende Polymermaterial.

18. Dämpfungseinrichtung nach einem der Ansprüche 1 bis 17, dadurch gekennzeichnet, daß die zellförmige Einlage aus zwei ineinandergreifenden, sinusförmigen, wellenähnlichen Webmaterialien besteht, die in umgekehrter Anordnung zueinander vorgesehen sind.

Revendications

1. Moyen d'amortissement et d'absorption des chocs pour application dans une chaussure du type comportant un soulier supérieur (1) fixé à une semelle (2) constituée au moins partiellement d'un matériau du type polymère, comprenant un soulier supérieur (1) et une semelle (2) de soulier, le soulier supérieur (1) étant fixé à un élément cellulaire rapporté (6) appliqué à l'intérieur du matériau du type polymère qui constitue la semelle (2), l'élément cellulaire rapporté (6) comprenant des couches (8, 9) de matériau polymère tissé, et comportant aussi une série de composants cellulaires (7) en matériau polymère tissé et disposés entre les couches (8, 9) de matériau et les connectant, et ayant une séri de spires tiss´es cellulaires identiqu s, les composants cellulaires (7) présentant des surfaces supérieure, inférieure et latérale, les couches (8, 9) de matériau polymère reliant les surfaces supérieure et inférieure des composants cellulaires (7), les composants cellulaires ayant des cavités générale-

ment ménagées à travers eux, les cavités ménagées étant disposées entre les surfaces supérieure et inférieure des composants cellulaires (7), la série des composants cellulaires (7) prévus dedans étant fixés par des torons de moyens de liaison suivant leurs surfaces latérales contiguës, l'élément cellulaire rapporté étant disposé en étant sensiblement en alignement à l'intérieur de la structure de la semelle pendant l'utilisation du soulier, l'élément cellulaire rapporté étant constitué d'un matériau polymère tissé ayant une dureté supérieure à celle du matériau polymère formant la semelle, d'où il résulte que l'élément cellulaire rapporté qui est formé à l'intérieur de la semelle a tendance à effectuer l'absorption des forces dues aux chocs que rencontre la chaussure pendant son utilisation.

2. Moyen d'absorption selon la revendication 1, dans lequel les composants cellulaires (7) sont formés de spires tissés disposées entre les deux couches tissées (8, 9) de matériau, et les spires tissées étant disposées sensiblement transversalement ou longitudinalement à la semelle formée.

3. Moyen d'absorption selon les revendications 1 ou 2, dans lequel la chaussure est une chaussure de sports athlétiques.

4. Moyen d'absorption selon l'une des revendications 1 à 3, dans lequel la semelle de la chaussure est constituée d'un polymère en mousse.

5. Moyen d'absorption selon l'une des revendications 1 à 4, dans lequel la chaussure comporte une partie à talon, et l'élément cellulaire rapporté (7) est encastré dans la partie à talon de la semelle formée.

6. Moyen d'absorption selon l'une des revendications 1 à 4, dans lequel l'élément cellulaire rapporté (7) est prévu pratiquement dans la totalité de la semelle de la chaussure.

7. Moyen d'absorption selon l'une des revendications 1 à 6, dans lequel l'élément cellulaire rapporté comprend au moins une seule couche de composants cellulaires.

8. Moyen d'absorption selon l'une des revendications 1 à 7, dans lequel l'élément cellulaire rapporté est prévu approximativement au centre de la semelle formée.

9. Moyen d'absorption selon l'une des revendications 1 à 8, dans lequel l'élément cellulaire rapporté (7) est prévu approximativement dans la partie supérieure de la semelle formée.

10. Moyen d'absorption selon l'une des revendications 1 à 9, dans lequel les cavités cellulaires des composants sont sensiblement exemptes du matériau en mousse constituant la semelle de la chaussure.

11. Moyen d'absorption selon l'une des revendications 1 à 9, dans lequel les vides des composants cellulaires (7) sont pratiquement remplis du matériau en mousse constituant au moins une partie de la semelle de la chaussure.

12. Moyen d'absorption selon l'une des revendications 1 à 11, dans lequel l'élément cellulaire rapporté (7) comprend des composants cellulaires enroulés hélicoïdalement, constitués de polymère, ayant une cavité qui les traverse généralement, d'où il résulte que l'élément rapporté cellulaire formé est enrobé à l'intérieur de la semelle de la chaussure.

13. Moyen d'absorption selon la revendication 12, dans lequel le composant cellulaire enroulé hélicoïdalement est façonné de manière à épouser sensiblement la forme des surfaces supérieure et inférieure de la semelle de la chaussure.

14. Moyen d'absorption selon la revendication 12, dans lequel le composant cellulaire enroulé hélicoïdalement est sensiblement façonné et disposé au moins sur une partie de sa surface.

15. Moyen d'absorption selon l'une des revendications 1 à 14, dans lequel la semelle de la chaussure est formée d'une partie de semelle extérieure, d'une partie de semelle intermédiaire fabriquée dans la partie de semelle extérieure, et la partie de semelle intermédiaire comporte l'élément cellulaire rapporté qui est formé dans son intérieur pendant la fabrication de la chaussure.

16. Moyen d'absorption selon la revendication 15, dans lequel le matériau polymère constituant la partie de semelle extérieure est un matériau polymère plus dur que le matériau polymère constituant la partie de semelle intermédiaire.

17. Moyen d'absorption selon l'une des revendications 1 à 16, dans lequel la semelle comporte les parties à talon et de semelle frontale, le matériau polymère constituant la partie à talon étant un matériau polymère plus dur quelle matériau polymère formant la partie frontale de la semelle.

18. Moyen d'absorption selon l'une des revendications 1 à 17, dans lequel l'élément cellulaire rapporté est constitué d'une paire de matériaux tissés identiques à ondulations, en forme de sinusoïde, entremêlés, les deux matériaux tissés étant inversés l'un par rapport à l'autre.

FIG. 1.

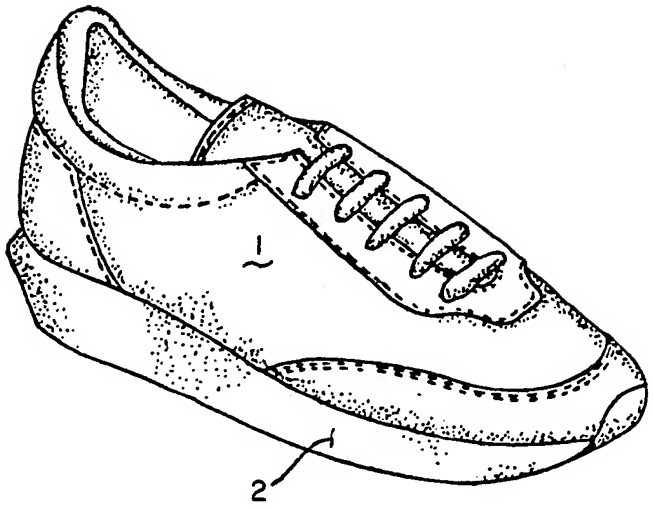


FIG. 2.

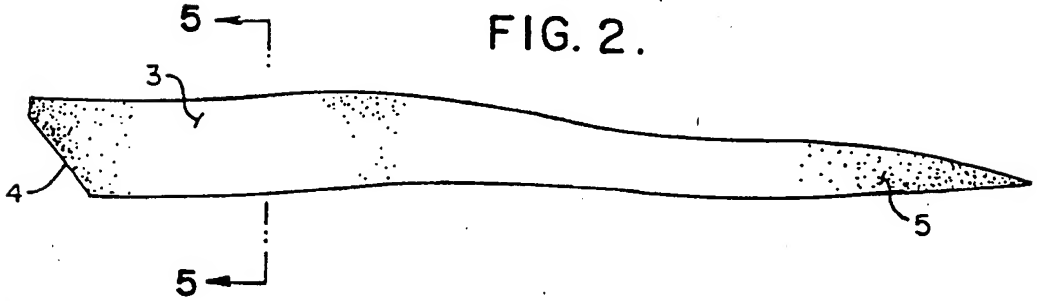
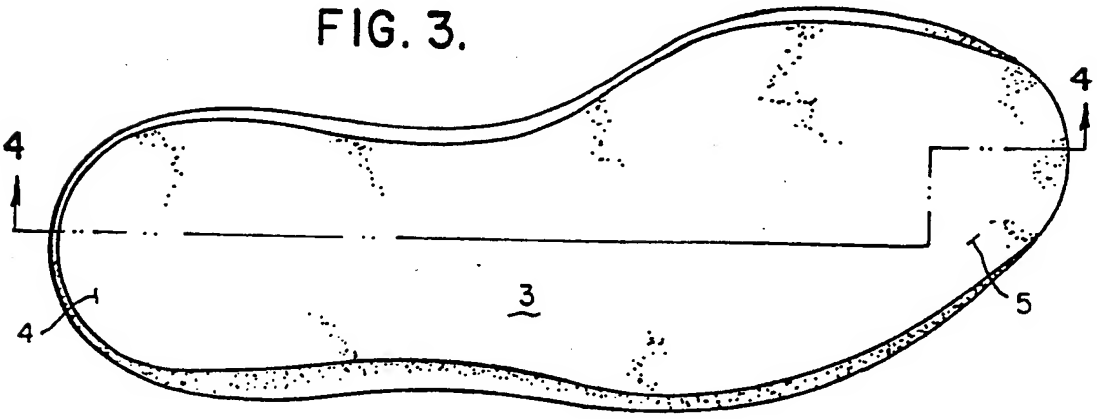
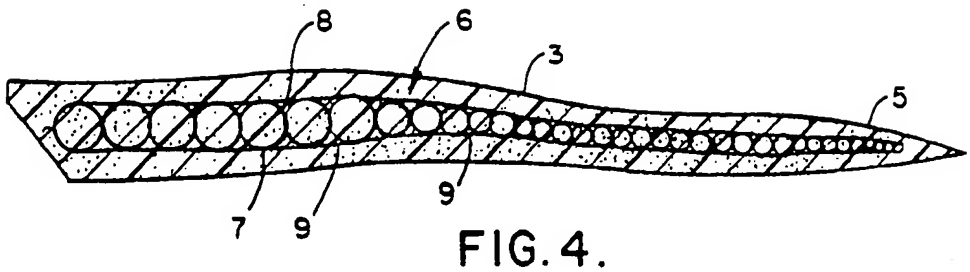


FIG. 3.





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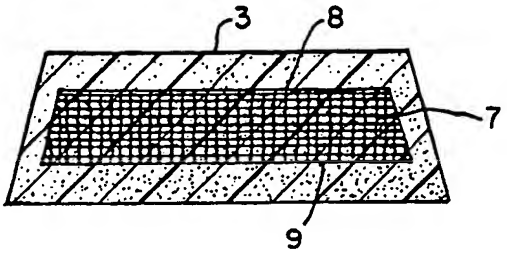
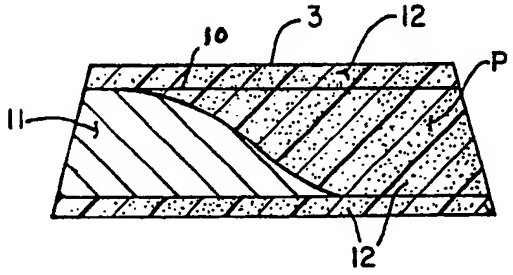


FIG. 5.



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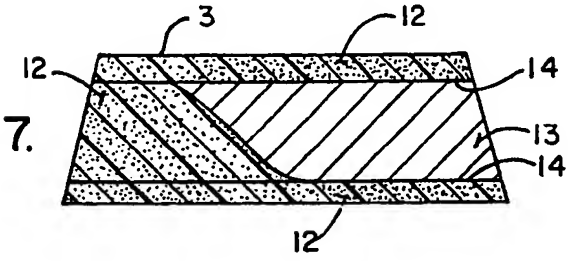

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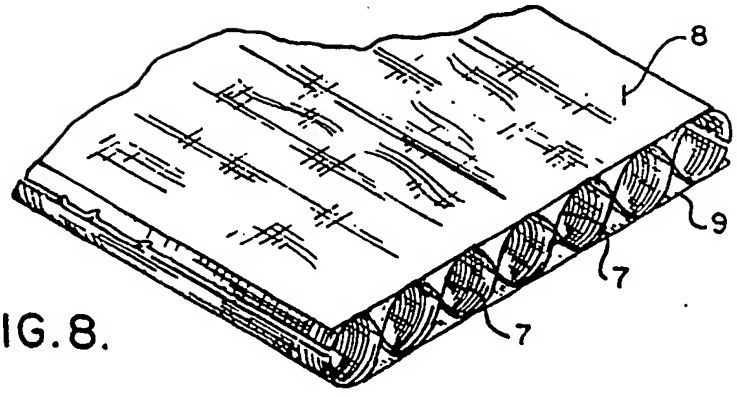


FIG. 8.

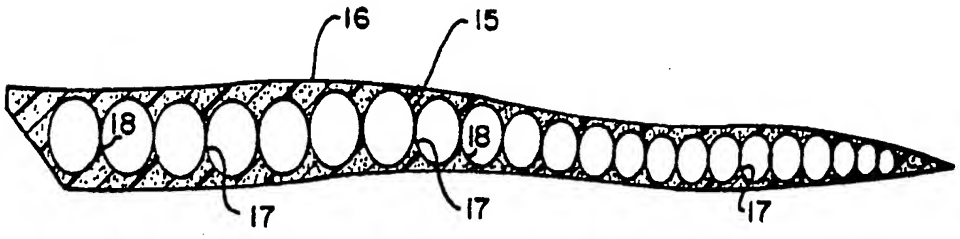


FIG.9.

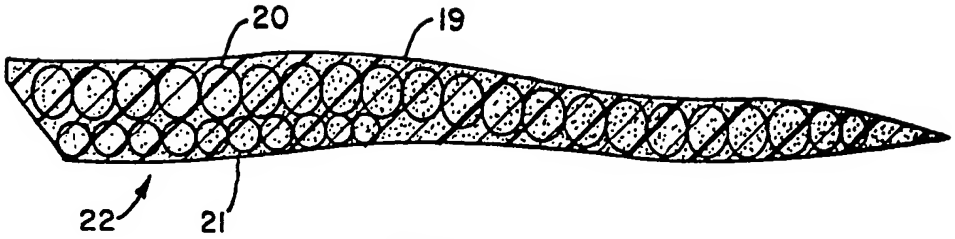


FIG.10.

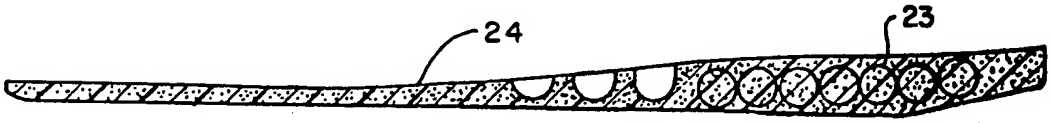


FIG.11.

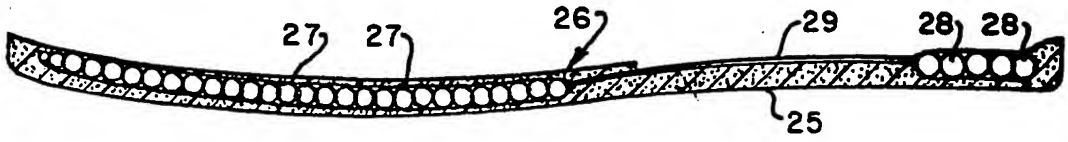


FIG.12.

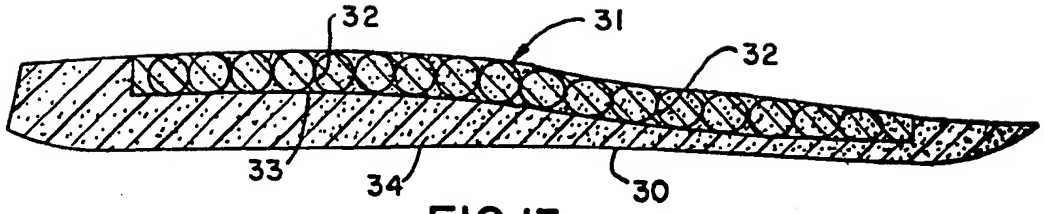


FIG.13.

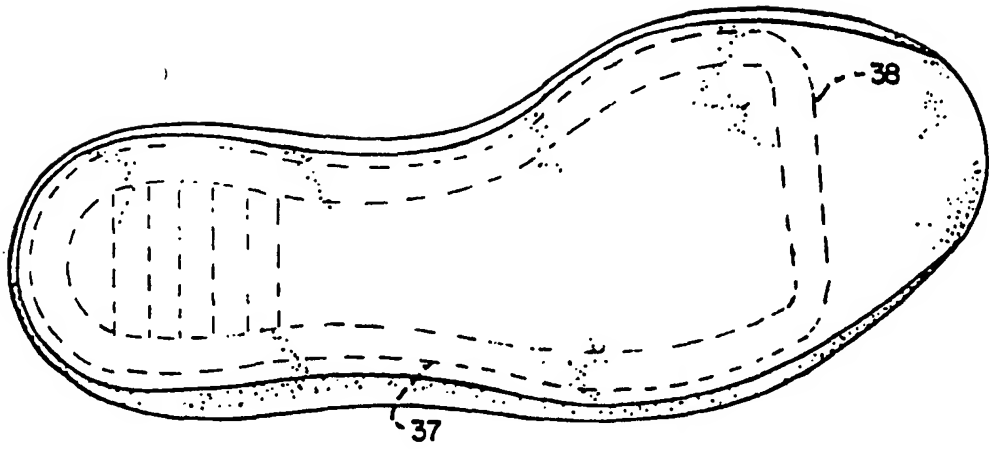


FIG. 14.

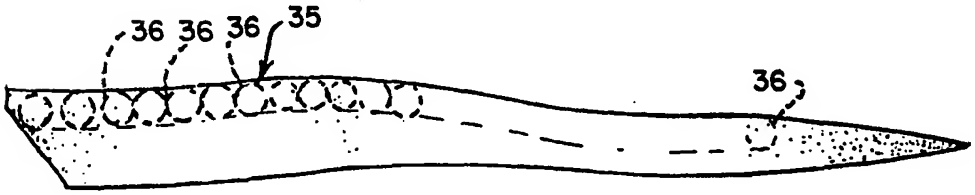


FIG. 15.

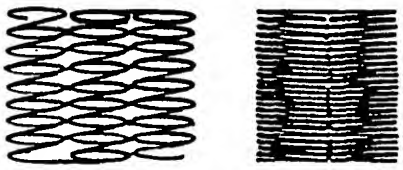


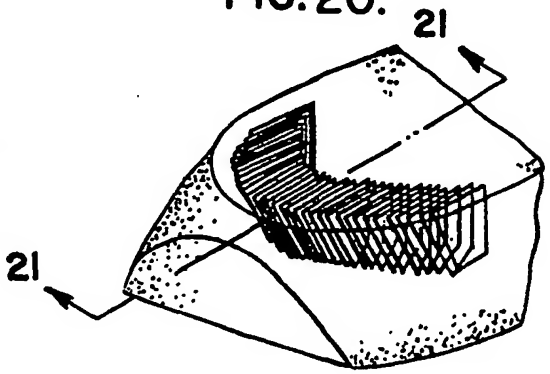
FIG. 16.

FIG. 18.

FIG. 17.

FIG. 19.

FIG. 20.



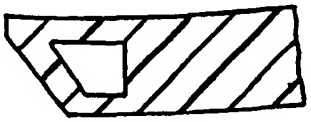


FIG. 21